

E.	Observed date.	Computed date.	O-C. d.
- 206	2396437	2396430	+ 7
153	2401248	2401260	- 12
104	2405690	2405685	+ 5
- 26	2412672	2412684	- 12

If the larger value, $90^{\text{d}}.47$, be related to the last observation the residual is only -7^{d} . It is evident, therefore, that the period of *T Centauri* is affected by some secular variation, the nature and amount of which we can only discover when a fuller series of observations has been secured.

The mean period of the star will probably be found to be not far from 90.3 days, with a range of from two to three days on either side of this mean period.

I would seek to acknowledge my great indebtedness to Sir David Gill and to Mr. R. T. A. Innes for their ever-ready willingness to make remoteness from a complete astronomical library less of a hindrance in investigations such as the preceding. They were good enough in the present instance to look up for me all the old records of *T Centauri*.

Lovedale: 1901 October 1.

On the Place of the Variable RU Herculis and Neighbouring Stars from Photographic Measures. By F. A. Bellamy, F.R.Met.Soc.

In No. 3384 of the *Astronomische Nachrichten* Dr. T. D. Anderson refers to a star of the ninth magnitude not given in B.D. He noted it as 9.1 magnitude in 1895 August; it was below the tenth magnitude on October 16, and became invisible later.

As there were several stars in the field of view of similar magnitudes, which rendered it difficult to identify the probable variable star with certainty, it seemed necessary that the position of it should be accurately determined, and this Dr. Hartwig did by measurement from two stars in the Cambridge and Berlin A.G. Catalogues with the heliometer; his results are included in an article on variable stars in *Astronomische Nachrichten*, 3553, and the positions given are

$$1900.0 \text{ R.A. } 16^{\text{h}} 6^{\text{m}} 2^{\text{s}}.76 \quad +25^{\circ} 19' 54''.7$$

and he adds a note to the effect that his observation was rendered difficult by the low altitude of the star and atmospheric conditions.

This star is in the region apportioned to this observatory for

the Astrographic Chart, and upon examination we find that it has been photographed on three plates.

		h	m		
427	R.A.	16	4	+25°	exposed 1893 June 12
778		16	8	+26	1895 May 29
1406		16	8	+26	1899 May 26

Plate 1406 replaces plate 778, as the latter only showed 76 stars with 2 images and 11 stars with 3 images, the exposures being 6^m, 3^m, and 20^s. Plate 1406 has 188 and 80 stars.

It seems important, as pointed out in a previous paper on *Nova Persei*, that the positions of variables and neighbouring stars should be given accurately. The object of this paper is to give accurate places of the variable star *RU Herculis*, and of all the stars photographed within 20' of it ; therefore all stars probably to the eleventh magnitude. By means of these the positions of other intermediate and fainter stars can readily be determined when required for comparison.

The measures of plate 427 were made by Mr. H. A. Freeborn in 1897 July 23, and of plate 1406 by Miss E. F. Bellamy 1900 September 11-14. The constants *a, b, c, d, e, f* were determined from a comparison of the computed ξ' and η' (1900.0) for stars in the Cambridge and Berlin A.G. Catalogues, with the measures corresponding to the same stars ; they are for

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>
Plate 427	+·00762	+·00164	-·3719	-·00190	+·00762	-·0918
1406	-·00026	+·00447	-·2910	-·00436	-·00045	-·1314

The application of these constants in the usual way gives the ξ' and η' in Table I., but these coordinates need only be given for plate 1406 ; the right ascensions and declinations (1900.0) were obtained for both plates, and the positions are the means of the two. The eighth and ninth columns contain the differences between the two plates.

The magnitudes in the third column are estimations, to the nearest third or half magnitude, made by myself in November this year.

TABLE I.

Ref. No.	Camb. A.G.C.	Oxford Mag.	ξ'	η'	Deduced			Difference	
			1900.0	1900.0.	R.A. 1900.0.	N. Dec. 1900.0.		1406-427	
			Plate 1406.					in	in
					h m s	° ' "		B.A.	Dec.
1	7492	9.5	1.3834	2.9930	16 3 43.30	25 9 44.6		+0.13	-0.7
2		10.0	2.6205	1.9904	4 10.78	4 47.0		+ .12	-1.3
3		9.7	2.7987	4.5099	4 14.32	17 23.5		+ .11	-2.2
4		11.0	2.8255	6.4584	4 14.66	27 6.8	
5		11.0	2.9175	8.9776	4 16.30	39 42.6	

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Ref. No.	Camb. A.G.C.	Oxford Mag.	ξ' 1900'0	η' 1900'0.	Deduced			Difference	
			Plate	1406.	R.A. 1900'0.	N. Dec. 1900'0.		in 1406-427 R.A.	in 1406-427 Dec.
6		10'0	2'9761	5'4301	16 4 18'17	25 21 59''1		+ 0'06	- 0'8
7		10'5	3'5413	2'9689	4 30'94	9 41'8		+ '16	- 0'2
8		10'0	3'7853	8'7807	4 35'57	38 45'2		+ '01	+ 0'2
9		9'7	3'7778	6'5631	4 35'71	27 40'4		+ '04	- 0'6
10	7496	8'5	3'9927	3'3620	4 40'90	11 40'5		+ '11	- 0'1
11		9'7	4'7097	6'5747	4 56'36	27 45'4		+ '01	- 0'1
12		10'3	4'7900	6'8087	4 58'11	28 56'0		'00	- 0'7
13		10'7	6'9414	4'3294	5 45'93	16 35'8		+ '15	- 1'3
14		10'0	7'3974	3'1658	5 56'15	10 47'0		+ '08	- 0'5
15		11'0	7'5099	6'2204	5 58'41	26 3'1		...	...
16	Variable		7'7077	4'9903	6 2'89	19 54'3		...	...
17		10'3	7'8055	3'3878	6 5'15	11 53'8		+ '06	0'0
18		11'0	8'1264	2'4336	6 12'24	7 8'3		+ '20	- 0'9
19		11'0	8'5363	5'6330	6 21'18	23 7'9		...	...
20		9'5	8'6046	7'2410	6 22'58	31 10'9		- '01	- 1'2
21		10'0	8'7604	6'4043	6 26'09	26 59'6		'00	- 0'2
22		10'7	8'8989	2'2604	6 29'35	6 16'6		+ '15	+ 0'3
23		9'5	9'2947	7'5711	6 37'88	32 50'8		- '04	- 1'6
24		11'5	9'6254	5'2190	6 45'31	21 4'7		...	...
25		11'5	9'8601	1'9414	6 50'66	4 41'7		...	...
26		10'0	10'2265	6'6907	6 58'54	28 26'5		+ '02	- 0'3
27		11'3	10'3339	8'3776	7 0'86	36 52'6		...	...
28		9'5	10'7712	6'9873	7 10'62	29 56'1		- '02	- 0'8
29	7525	8'7	10'8004	3'7127	7 11'38	13 33'9		- '05	+ 0'4
30	7528	8'5	10'9892	9'1522	7 15'38	40 46'2		- '04	- 1'9
31	7533	8'7	12'1575	6'9210	16 7 41'32	25 29 36'3		'00	0'0

Nos. 4, 5, 15, 19, 24, 25, 27 are not visible on plate 427. Though *RU Herculis* is visible on plates 427 and 778, the images are so faint that satisfactory measures cannot be made; when the scale is placed over them they become invisible.

With regard to the differences (especially in R.A.) it should be mentioned that the constants for these two plates (427 and 1406) were derived from stars in the Catalogue of the Ast. Gesellschaft, observed at Cambridge and Berlin. For plate 1406 all the stars are from the Cambridge, whilst for plate 427 five of

the twenty-five stars used are from the Berlin B. Catalogue, all these being in the southern half of the plate. The question arises whether there is any systematic difference between the R.A.'s of Cambridge and Berlin B. Catalogues.

In the introduction to the Greenwich 1890.0 Catalogue, p. 47, comparisons are given Greenwich—Cambridge and Greenwich—Berlin B., and the systematic differences in R.A. are $-0^s.04$ (198 stars) and $-0^s.03$ (282 stars), whence C—B is $+0^s.01$. But this comparison depends on the brighter stars only, and for our present purpose is illusory; for, the majority of stars in Cambridge and Berlin B. Catalogues are of the 8th to the 9th magnitude, and even fainter, and the Cambridge observations are affected by a very pronounced magnitude equation, as pointed out by Mr. A. R. Hinks (*Monthly Notices*, lvii., p. 473), using 671 stars, and by Professor Turner (*Monthly Notices*, lx., p. 3), using 5,384 stars. In fact, while the R.A.'s of the mean bright star (probably about the $5\frac{1}{2}$ or 6th magnitude) of the Cambridge and Berlin are the same, those of the mean 8th and 9th magnitude star differ by $0^s.07$ at least.

If, then, the places from Cambridge and Berlin are taken just as they stand, the lower and southern half of the plate, depending chiefly on Berlin stars, will be displaced in R.A. with reference to the northern half of the plate; and this will alter the orientation (constant b) deduced from the x coordinates. Assuming the above difference of $0^s.07$, the effect is to increase b by $+0.0025$, and there is a consequent correction of -0.0053 to c . A systematic difference has been noticed in declination by Mr. Hinks, the amount being $0''.5$, which will similarly alter the scale value (constant e) deduced from the y coordinate.

In the particular case of plate 427 these quantities are probably excessive, for there are 5 Berlin stars in the lower half, but the total number is 8. Nevertheless they are quite inadequate to account for the systematic difference in R.A. as appears from the subjoined Table II., in which the differences in Table I. are compared with those due to the above alterations in b and c .

The main cause of the discordance between the two plates must accordingly be sought for elsewhere—probably in the accidental errors of the reference stars (including proper motions from the dates of meridian observations to 1900.0, and for the six years between the two plates)—and though these will ultimately be fully discussed, for the present it will serve the main purpose of this paper to give the mean of the results as they stand, as has been done in Table I.

TABLE II.
Plate 1406–427.

Ref. No.	Difference as in Table I. s	Correction for Magnitude Equation. s	Difference Corrected. s
1	+ 0.13	− 0.03	+ 0.10
2	+ .12	− .03	+ .09

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Ref. No.	Difference as in Table I. s	Correction for Magnitude Equation. s	Difference Corrected. s
3	+ 0.11	- 0.02	+ 0.09
6	+ .06	- .01	+ .05
7	+ .16	- .03	+ .13
8	+ .01	+ .01	+ .02
9	+ .04	- .01	+ .03
10	+ .11	- .03	+ .08
11	+ .01	- .01	00
12	.00	- .01	- .01
13	+ .15	- .02	+ .13
14	+ .08	- .03	+ .05
17	+ .06	- .03	+ .03
18	+ .20	- .03	+ .17
20	- .01	.00	- .01
21	00	- .01	- .01
22	+ .15	- .03	+ .12
23	- .04	.00	- .04
26	+ .02	.00	+ .02
28	- .02	.00	- .02
29	- .05	- .02	- .07
30	- .04	+ .01	- .03
31	.00	.00	.00

The plates afford some information as to the magnitude of the variable. On plate 427 ($16^h 4^m + 25^\circ$ 1893 June 12) it is at the limit of visibility; in fact, it had been omitted in the original measures of the plate, though stars certainly as faint as 10.5 mag. had been measured, and was only detected when examining it for this paper by first computing its coordinates, and so knowing exactly where to look for it.

The star is visible on plate 778 ($16^h 8^m + 26^\circ$ 1895 May 29), but again was only found by previously ascertaining its exact position. The plate had been rejected as having an insufficient number of stars; there were only 11 stars shown by the 20^s exposure, whereas Argelander gives 57 in the same region. It can be inferred that quite 1.5 magnitudes were lost on this plate, and so the magnitude of *RU Herculis* would be about 9.5. It was in 1895 August that Dr. Anderson first noticed that the star was missing in the B.D., and he then estimated it to be 9.1.

When the third plate (1406) was taken, 1899 May 26, the star was very near its maximum, and was undoubtedly as bright or brighter than Camb. 7533 (B.D. + 25° , 3046), magnitude 9.0.

If the star is red in appearance this will be equivalent to increasing the mags. given from the plates by at least several tenths

Dr. Hartwig gives the period as 473* days. According to Mr. J. A. Parkhurst, the star is equal to the fourteenth magnitude at its minimum.†

Further Observations of the New Star in Perseus made at the Radcliffe Observatory, Oxford.

(Communicated by Arthur A. Rambaut, M.A., Sc.D., F.R.S.,
Radcliffe Observer.)

This paper contains the results of observations upon the brightness and colour of the new star in *Perseus* made at the Radcliffe Observatory since the date of the last meeting of the Society, and is in continuation of the Notes on the same subject already communicated to the Society, and published in the *Monthly Notices* for March, April, May, and June.

The periodical fluctuations in the brightness of the *Nova* which had been observed up to the end of the first week in June appeared to die out about the middle of that month. The last observed maximum ($4^{\text{m}}.57$) was on June 8. The next estimation of magnitude was $5^{\text{m}}.80$ on June 17, and since that date the observations show a gradual diminution of brightness at the rate of about $0^{\text{m}}.01$ per diem, the magnitude on November 1 being 7.1 . If the magnitudes be plotted as ordinates with the dates as abscissæ, a straight line drawn through them will lie within $0^{\text{m}}.2$ of all observations, and the discrepancies show no trace of periodicity. Small changes of brightness have occasionally been suspected by the observers in the course of a night's observations.

During the months of June and July the star was observed under unfavourable conditions at a small altitude above the northern horizon. In July the image of the *Nova* was frequently noted as being "dull," and "larger" than the other stars, but since then it has generally appeared sharp and stellar.

On August 22 the image of the *Nova* was carefully examined to test whether any trace could be found visually of the aureole which MM. Antoniadi and Flammarion had seen surrounding the photographic image. No indication of such an aureole could be discovered (see Observers' Notes for that date).

A marked change has also taken place in the colour of the star. The redness previously conspicuous at minimum has gradually disappeared, and the star is now for the most part colourless. On June 17 it was described as very red. From August 8 to August 24 it appeared pale yellow with occasionally a red fringe which did not show in the other star images. From August 27 to November 1 it is generally noted as colourless, with,

* *Vierteljahrsschrift der Astron. Gesell.*, Jahr. 34, p. 315.

† *Astrophysical Journal*, vol. xiv, p. 172.